REMARKS

Claims 18, 20-38 and 62-73 are pending. Claims 18, 20, 22, 27, 62, 64, 67, 68 and 70 have been amended for clarity. Specifically, claims 18, 27 and 67 have been amended to clarify that the radiation beam is a light beam as indicated in now cancelled claim 19. Claims 18, 27 and 67 have also been amended to clarify that the reacting of the reactant to form the products involves a chemical reaction. This feature is supported throughout Applicant's specification. Claim 19 is cancelled without prejudice in view of the amendment of claim 18. Claims 20, 22, 64, 67, 68 and 70 have been amended for consistency with the corresponding amended independent claims. No new matter is introduced by the amendments.

Applicant thanks the Examiner for the courtesy extended to their undersigned representative in a telephone interview on October 15, 2007 and a follow up telephone interview on October 25, 2007. In the first interview, a proposed amendment was discussed in the context of the cited references. In response to Applicant's indication that the high energy beam of Akedo was not a laser, the Examiner noted that the primary reference Whitney disclosed the use of the laser to change the state of particles to make them stick to the surface of the substrate so that the distinct device had a comparable function. Thus, the Examiner maintained that the high energy beam of Akedo and the laser of Whitney were substitutes for each other. Applicant noted that the light beam of the claimed invention performed a very different role from the high energy beam of Akedo and correspondingly from the laser of Whitney. Applicant proposed to further clarify this distinction in the claims. The Examiner indicated that such an amendment could help distinguish the references. In the brief follow-up discussion, a revised draft amendment was discussed. The Examiner indicated that the new amendment overcame the present rejections since the energy beams of the references were performing different functions. Applicant's representative indicated that the Amendment would be filed. The Examiner indicated that she would then up-date her search accordingly.

Applicant acknowledges with appreciation the allowance of claims 33-38 and 71-73 and the allowability of claims 29-32. Applicant respectfully requests reconsideration of the remaining rejections based on the above amendments and the following remarks.

Rejection Over Whitney et al. and Akedo et al.

The Examiner rejected claims 18-20, 22-24, 25-28, 62, and 64 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,043,548 to Whitney et al. (Whitney) in view of U.S Patent 6,280,802 to Akedo et al. (Akedo). With all due respect, Applicant respectfully asserts that there are several deficiencies regarding this rejection. First, the energy beams of Akedo are not light beams. To clarify this issue and to clarify the distinction of the function of the light beam in Applicant's claimed invention from the function of the Akedo high energy beam and the laser beam of Whitney, Applicant has amended claims 18 and 27 for clarity. Furthermore, Whitney teaches away from the combination. Based on the clarifications, the combined teachings of the cited references clearly do not render the claimed invention *prima facie* obvious. Applicant respectfully requests reconsideration of the rejections based on the following comments.

With respect to Whitney, Whitney discloses, for example, "[T]he beam 146 of the laser 102 is focused by the optical system 104 to a focal point 150 that is on the beam axis 106 and within the confinement chamber 128. The focal point 150 is sufficiently far from the surface of the substrate that the combination of direct heating and plasma heating are not sufficient to melt the surface of the substrate." See, for example, col. 5, lines 47-53. Whitney also discloses, for example, that "[t]he heating of the substrate is influenced by the plasma, with a plasma entirely contained within the apparatus 10 heating the substrate only by the relative small amount of radiation through the opening 116. The substrate is also heated by the energy released as the

deposited atoms solidify and by the energy of the laser beam that is transmitted through the plasma and reaches the substrate in a defocused state." See, for example, col. 6, line 67-col. 7, line 6.

In the axial flow, laser plasma spray apparatus of Whitney, the laser beam is focused within a chamber just above the substrate, which necessarily aims the laser beam toward the substrate. See, column 3, line 10 to column 4, line 20. The configuration taught in Whitney is central to their deposition process since the nozzle is designed for the formation and direction of a plasma using energy from the laser beam. The Whitney process becomes non-functional for its intended purpose if the combination suggested by the Examiner is imposed on the system. The Whitney method would not be expected to work for its intended purpose based on the teachings in Whitney if modified as suggested by the Examiner. Thus, Whitney teaches away from the suggested combination.

However, the Examiner appropriately noted that Whitney teaches the melting of the feed material for deposition onto the substrate. Thus, the Examiner took the position that the Akedo high energy beam that activates the particle flow for deposition was a substitute for the laser of the Whitney system. For reasons discussed below, Applicant respectfully disagrees with this position. But Applicant amended their claims to clarify the distinction of their process based on a chemical reaction from both the systems of Whitney and Akedo.

Akedo does not teach a light beam or laser beam intersecting the flow. Applicant has clarified that the "high-energy beam 2" of Akedo are not laser beams or light beams, but are matter beams. See column 6, lines 31-35, "a high-energy beam 2 which is an ionic, atomic or molecular beam or low temperature plasma or other high-speed, high-energy beam of high-energy atoms or molecules is generated from the high-energy beam gun 3." See also column 2,

lines 46-49, "irradiating the ultrafine particles and substrate with an ionic, atomic or molecular beam or low-temperature plasma or other high-speed, high-energy beam of high-energy atoms or molecules."

While the Examiner suggested that the high energy beam of Akedo is a reasonable substitute for the laser beam of Whitney, these devices do serve **different functions**. In Whitney, the laser beam is used to generate a plasma that "**melts**" the feed particles for deposition. See, the abstract, column 3, lines 2-9 and throughout. In stark contrast, Akedo teaches depositing the feed material as "**unfused**" particles. See, for example, the abstract ("without being fused"), and column 2, line 61 to column 3, line 12 ("without causing fusing or decomposition of the particles"). Since melted particles inherently fuse in the Whitney method and since Akedo teaches avoiding fusing, the laser beam of Whitney does not function equivalently to the high energy beam of Akedo.

Furthermore, Applicant has clarified the nature of the process in the claimed method. In particular, it has been emphasized that the reactant flow undergoes a chemical reaction driven by the light beam. Thus, the light beam of Applicant's method **functions differently** from the beams in either Akedo or Whitney since these beams do not drive a chemical reaction.

Since neither of the references teach a light beam oriented as claimed by Applicant's with the function of driving a chemical reaction, it is clear that the combined teachings of the references do not render Applicant's claimed invention *prima facie* obvious. Furthermore Whitney teaches away from the claimed combination since it becomes nonfunctional upon forming the modification suggested by the Examiner. Applicants respectfully request withdrawal of the rejection of claims 18-20, 22-24, 25-28, 62, and 64 under 35 U.S.C. § 103(a) as being unpatentable over Whitney in view of Akedo.

Rejection Over Whitney et al., Akedo et al. and Rao et al.

The Examiner rejected claims 21, 63 and 65-70 under 35 U.S.C. § 103(a) as being unpatentable over Whitney and Akedo in view of U.S. Patent 5,874,134 to Rao et al. (Rao). Rao fails to disclose or suggest the feature "...the light beam, which does not intersect the substrate..." Thus, Rao fails to make up for the deficiencies of Whitney and Akedo. Furthermore, Rao teaches away from the claimed method. In addition, the laser of Rao functions very differently from either the laser of Whitney or the high energy beam of Akedo. Applicant respectfully request reconsideration of the rejection based on the following comments.

With respect to the specific orientation of Whitney, if element 14 is a laser, it is directly oriented toward the substrate 22. If it is not oriented toward the substrate, it would not strike the reactant flow at all based on the construction of the plasma nozzle. It follows that Rao also teaches away from the modification suggested by the Examiner since the Rao device becomes non-functional for its intended purpose if modified as suggested by the Examiner.

Furthermore, it is noted the energy source, i.e., plasma arc torch or laser, initiates a chemical reaction of the reactants. In stark contrast, the laser in Whitney only melts the feed particles or a portion thereof for the formation of the coating. In further contrast, the high energy beam of Akedo interacts with the flow to activate the flow without altering the crystal structure or particulate nature of the feed so that unfused particles are deposited as a particle coating. Thus, the laser beam of Rho, the laser beam of Whitney and the high energy beam of Akedo all have **very different functions** from each other. They are in no way substitutes for each other. Therefore, it is not appropriate to alter the configurations of one device based on the other devices since they do not function in the same way.

Based on these clear differences between the teachings of the references, the combined teachings of the references do not reasonably teach a light beam reacting with a reactant flow in which the light beam not intersecting the substrate. Thus, the combined teachings of the

references do not render Applicant's claimed invention *prima facie* obvious. Applicants respectfully request withdrawal of the rejection of claims 21, 38, 63 and 65-70 under 35 U.S.C. § 102(b) as being obvious over Whitney in view of Rao.

CONCLUSIONS

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,

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